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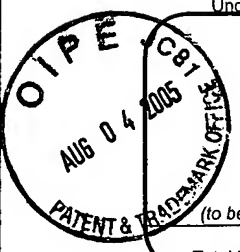

TRANSMITTAL FORM

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Total Number of Pages in This Submission: 13

Application Number	10/721,669
Filing Date	November 25, 2003
First Named Inventor	Cirjak
Art Unit	1621
Examiner Name	Michael L. Shippen
Attorney Docket Number	BP7339.06

ENCLOSURES *(Check all that apply)*

- [x] Fee Transmittal Form
  - [ ] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
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Remarks

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Firm Name			
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Date	August 1, 2005	Reg. No.	27368

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
(Board of Patent Appeals and Interferences)

Applicant(s):	L. M. Cirjak, et al.	)	PATENT APPLICATION
Application No.::	10/721,669	)	Group Art Unit: 1621
Confirmation No.:	5945	)	
Filed:	November 25, 2003	)	Examiner: Michael L. Shippen
For:	Fluid Bed Process for the Acetoxylation of Ethylene in the Production of Vinyl Acetate	)	Attorney Docket No.: BP7339.06

Appeal Brief

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This is an appeal from the Final Rejection of Claims 16 and 18-28 in the above-identified application. Appellant notes that the Final Rejection lists claims 16-28 as rejected, although claim 17 had been cancelled in an Amendment and Response mailed November 18, 2004.

Real Party in Interest

The real party in interest to this appeal is The Standard Oil Company, a corporation of Ohio, which is a subsidiary of BP p.l.c.

Related Appeals and Interferences

Application 09/981,454, the parent of the currently appealed application, and Application 09/703,805, the grandparent of this application, were subject to appeals

[Appeal 2003-2012 and Appeal 1999-1310, respectively] to the Board of Interferences and Patent Appeals. Neither appeal proceeding is pending.

Status of Claims

1.	Cancelled	
2.	Cancelled	
3.	Cancelled	
4.	Cancelled	
5.	Cancelled	
6.	Cancelled	
7.	Cancelled	
8.	Cancelled	
9.	Cancelled	
10.	Cancelled	
11.	Cancelled	
12.	Cancelled	
13.	Cancelled	
14.	Cancelled	
15.	Cancelled	
16.	Rejected	On Appeal
17.	Cancelled	
18.	Rejected	On Appeal
19.	Rejected	On Appeal
20.	Rejected	On Appeal
21.	Rejected	On Appeal
22.	Rejected	On Appeal
23.	Rejected	On Appeal
24.	Rejected	On Appeal
25.	Rejected	On Appeal
26.	Rejected	On Appeal
27.	Rejected	On Appeal
28.	Rejected	On Appeal

Status of Amendments

No amendments are pending.

Summary of Invention

Appellants' invention is directed to a fluidized bed, gas-phase, process for manufacture of vinyl acetate from ethylene, acetic acid, and oxygen. In Appellants' process, separate feed streams primarily containing hydrocarbons and oxygen are introduced into a fluidized bed reactor, such that neither feedstream nor the outlet gas from the reactor is within flammability limits. Because oxygen is consumed in the reactor through catalytic oxidation of ethylene and acetic acid to form vinyl acetate, the oxygen concentration in the reactor will be lower than the sum of components of the input feedstreams. Also, because the oxygen concentrations in the feedstreams are constrained by safety concerns of creating an explosive mixture, separation of the feedstreams results in an effective higher usage of oxygen in the reactor. This increases the oxidation efficiency of the catalytic oxidation reaction.

Separation of the primary oxygen feedstream from the primary hydrocarbon feedstream is possible in Appellants' fluidized system because the fluidization medium in the reactor will prevent uncontrolled oxidation at the point of entry of the oxygen feedstream into the reactor. In contrast, a separate introduction of high concentration oxygen into a fixed bed catalytic reactor system would not be possible because of the probable creation of a "hotspot" at the point of entry.

Significantly, the invention claimed in independent claim 16 requires that the total amount of oxygen employed is higher than may be used without danger of flammability, if all streams were combined. In independent claim 27, the levels of oxygen employed are higher than may be used in a fixed bed reactor, without danger of flammability.

Appellants' invention results in a more efficient oxidation reaction within acceptable safety restrictions.

Issues

A. Are claims 16-28 obvious under 35 USC 103(a) over Sennewald et al. (GB 1,266,623) and Sennewald et al. (GB 1,266,624)?

B. Are claims 16-28 obvious under 35 USC 103(a) over Sennewald et al. (GB 1,266,623) and Sennewald et al. (GB 1,266,624) in view of Calcagno (US 3,714,237)?

Grouping of Claims

Appellant asserts that the appealed claims fall in two groups corresponding to independent claims 16 and 27.

Both independent claims are directed to a process to manufacture vinyl acetate in a fluid bed reactor in which ethylene, acetic acid, and oxygen are fed into the reactor in multiple inlets such that oxygen/hydrocarbon concentrations in any single inlet are not within flammability limits.

However, claim 16 contains a functional limitation as to the total oxygen concentration, "wherein the total amount of oxygen employed is higher than may be used without danger of flammability, if all feed streams were combined."

Claim 27 expresses the functional amount of oxygen introduced in terms of "whereby levels of oxygen are employed higher than may be used in a fixed bed reactor."

Both functional representations of the total amount of oxygen used in Appellants' process exceed that disclosed in the prior art.

Argument

References Relied Upon by the Examiner

G.B. Patent	Date	Name
1,266,623	3/72	Sennewald et al.
1,266,624	3/72	Sennewald et al.

U. S. Patent	Date	Name
3,714,237	1/73	Calcagno et al.

Examiner's Rejection

A. The Examiner rejected claims 16-36 under 35 USC §103(a) over Sennewald et al. (GB 1,266,623) and Sennewald et al. (GB 1,266,624). The Examiner stated that the primary references teach the claimed process except oxygen is not introduced in a further inlet. The Examiner further asserted that whether oxygen is added with the other reactants or separately "appears to be merely an arbitrary choice," since one would expect all reactants to undergo the same reaction whether the mixing occurs before the reaction zone or within the reaction zone. The Examiner further asserted that the limitations added in the instant application are not seen to further distinguish the

claims from the prior art. Specifically, the added limitation as to sufficient amount of particulate material in the reactor to allow dissipation of heat was dismissed a reciting an inherent property of a fluid bed catalysts "does not define a catalyst that [is] different from the prior art catalysts. Further, the limitation to total oxygen content was not seen to be substantially different from what is taught in the prior art. The Examiner noted that "the claims appear to read on the amount exemplified in the prior art, note Example 2 of the references [Sennewald] uses 8% oxygen which is apparently within the claimed range. Note applicants' claim 26 which indicates that the amount may be 8%. Also, note the top portion of page 9 of the specification that the amount may be 8%."

B. The Examiner rejected claims 16-36 under 35 USC §103(a) over Sennewald et al. (GB 1,266,623) and Sennewald et al. (GB 1,266,624) optionally in view of Calcagno et al. (US 3,714,237). In addition to the combination of Sennewald '623 and Sennewald '634, Calcagno et al. was cited as suggesting that oxygen may be added separately in the acetoxylation art, although Calcagno et al. operates in the liquid phase.

Appellants' Response

Issue A

The primary rejection of Applicants' claims is based on a combination of Sennewald et al. '623 and Sennewald et al. '624, which describe a fluidized bed, gas-phase, reactor process to form vinyl acetate from ethylene and oxygen using a stated catalyst and process conditions. The Examiner admitted that the Sennewald et al. references do not teach introduction of oxygen in a further inlet. The Examiner relied on the reasons of record that the use of a separate inlet "appears to be merely an arbitrary choice." The limitations as to total oxygen content were dismissed.

Appellants submit the Examiner has misconstrued the claimed invention. Specifically, the main claims now state a functional limitation to the total oxygen content added to the reactor. This primary limitation is consistent with Appellants' longstanding view of their invention as providing a more efficient acetoxylation process. Appellants submit that the issue is not whether the reactants undergo the same reaction or whether mixing of reactants occurs before of within the reaction zone. There is no dispute that the basic reaction chemistry is the same in Appellant's process and the prior art, in that ethylene, acetic acid, and oxygen undergo acetoxylation to form vinyl acetate. The

difference between Appellants' process and the prior art is that Appellants can put more total oxygen in the reactor, which makes the overall process more efficient. This effect is accomplished by using multiple feed inlets in which hydrocarbon/oxygen mixtures are not within flammability limits. It is this process that is the basis of Appellants' invention, not differences in catalyst or reaction mechanisms.

The Examiner's comparison of dependent claim 26 in which the concentration of oxygen entering the reactor may be between 8 and 25 volume percent and Sennewald Example 2 is misplaced. Claim 26 ultimately is dependent on independent claim 16 which contains a primary functional limitation to total oxygen content as higher than may be used without danger of flammability if all feed streams were combined. Claim 26 merely identifies that such flammability limit may be between 8 and 25 vol.% in a particular feed mixture, and does not specify that total oxygen may be as low as 8 vol.% in all feed mixtures. There is nothing in Sennewald that indicates that mixed feed in its Example 2 actually would be within flammability limits.

Appellants note that in the Examiner's Answer in the parent case, it is stated:

> "No unexpected result is seen for supplying the oxygen separately at the same concentration as suggested in the prior art and applicants do not allege that their process would afford any [un]expected result when operating at lower oxygen feed rates. The claims do not require that the amount of oxygen used can exceed the flammable limits of the feed mixture." (emphasis added)

Appellants have now included the limitation into their claims, which the Examiner apparently believed would distinguish the previous claims over the prior art.

No *Prima Facie* Basis For Obviousness of the Claimed Invention

Appellants submit there has not been shown a *prima facie* basis for the rejection of the claimed invention. Alternatively, Appellants submit that they have provided sufficient affirmative evidence to overcome any rejection made under 35 USC 103(a) over either or both of these cited references.

The claimed invention requires that "the total amount of oxygen employed is higher than may be used without danger of flammability, if all feed streams were combined." This condition is achieved in the claimed invention by adding reactants in separate gas feedstreams which alone are not within flammability limits. As indicated above, the invention is not conditioned on the reaction chemistry of combining ethylene, acetic acid,

and oxygen, but the ability to use safely a higher total amount of oxygen in the reactor. Thus, the assertion that all reactants undergo the same reaction whether mixing occurs before the reaction zone or within the reaction zone does not provide a basis for extending the teachings of the Sennewald references to suggest Appellants' claimed invention.

No disclosure in either Sennewald document or a combination thereof has been asserted to suggest increasing the total oxygen content in the reactor by adding separate feedstreams such that if the feedstreams had been combined, the oxygen content would exceed flammability limits.

This is also true to the claimed invention that requires the total amount of oxygen to be higher than may be used in a fixed bed reactor.

Appellants further submit that a conclusory statement that "whether oxygen is mixed with the other reactants prior to introduction into the reaction zone or added separately appears to be merely an arbitrary choice" does not provide evidence of a motivation to modify the teachings of either of the Sennewald references.

In prior prosecution of the parent cases, a reference was made to a statement in the Sennewald documents that stated, "[i]t is interesting to state here that particularly the dissipation of the reaction heat can be readily achieved at the high catalytic activity in the fluidized bed." (Sennewald '623, page 3, lines 32-36) This statement as to the general benefits of a fluidized bed system do not negate the fact that Sennewald et al. do not disclose two critical elements of Applicants' invention. Those are use of multiple feed inlets and use of higher amounts of oxygen than permitted in a single inlet system (as used by Sennewald et al.). The addition of these two new elements reflect the difference between the prior art and Appellants' invention, neither of which are suggested in the Sennewald documents. An assertion that addition of these two elements is now "obvious" is an example of pure hindsight based on Appellants' discovery that use of these two new elements create a beneficial result.

Thus, the Office has not met its burden of making a *prima facie* case of obviousness of the claimed invention over the cited Sennewald references.

Appellants note the combination of Sennewald et al. '623 and Sennewald '624 et al. teaches no more than either of the references teach separately with respect to Appellants' claimed invention. Sennewald et al. '623 describes a catalytic fluidized bed

process to form vinyl acetate from ethylene, acetic acid, and molecular oxygen. Sennewald et al. '624 further describes the same process with generalized reactants and products, such as manufacture of unsaturated carboxylic esters by reacting an olefin or diolefin, an aliphatic or aromatic carboxylic acid, and oxygen. An example in Sennewald et al. '624 is formation of vinyl acetate from ethylene, acetic acid, and oxygen. Since with respect to Appellants' claims, the combination of the Sennewald references is no more pertinent than either separately, this rejection should be considered as being over a single reference.

As stated in *In re Kotzab*, 217 F.3d 1365, 1370, 55 U.S.P.Q.2d (BNA) 1313 (Fed.Cir. 2000):

> "When obviousness is based on a particular prior art reference, there must be a showing of a suggestion or motivation to modify the teachings of that reference."

Rejection based on "obvious to try" coupled with improper hindsight

Rejection of Appellants' claims that require a separation of feedstreams based on "merely an arbitrary choice" and use of total higher oxygen amounts also is improper because the underlying reasoning of this basis is an "obvious to try" rejection, which further requires "hindsight" to produce Appellants' claimed invention. Appellants respectfully submit that such a rejection cannot be maintained.

Appellants have provided affirmative evidence of non-obviousness

Irrespective of the non *prima facie* showing of obviousness, Appellants have provided evidence in the form of the Williams Declaration and statements in the Specification to establish the advantage of separate input feedstreams. That is, the process is capable of operating safely at higher oxygen usage rates than would be a similar system with only a single, combined oxygen/hydrocarbon feedstream. This evidence directly contradicts the Examiner's unsupported assertion that separation of the feedstreams is "merely an arbitrary choice."

The specification points out advantages of using a separate oxygen-containing feed to increase production of product.

For example, the specification states at page 6, lines 12-20:

> "This unique feature of the fluid bed process allows significantly higher levels of oxygen and ethylene to vinyl acetate without danger of flammability. The utilization of higher levels of oxygen permit substantially higher levels of

ethylene and acetic acid conversion than are possible in the fixed bed process."

This is further evidence provided by the Appellant that separation of the feedstreams is not an arbitrary choice but one that was not suggested by the cited prior art to produce an advance in the art.

Based on the combination of Sennewald et al. '623 and Sennewald et al. '624, Applicants submit that there is no suggestion of using a separate oxygen feed to achieve a higher total oxygen content in the reactor. The argument of an "arbitrary choice" is negated by the conventional disincentive to use separate oxygen feeds in other gas-phase acetoxylation processes. Applicants' claims require a separate oxygen-containing gas feed, which permits increased oxygen use in the catalytic reaction over a conventional fixed bed system. Although a process may be performed at different oxygen input levels, the claimed invention requires that the process is conducted at an increased oxygen use. This is not disclosed or suggested in the cited art.

Issue B

The secondary, or optional, rejection basis for claims 16-36 was the Sennewald references in further combination with Calcagno et al., which describes a separate oxygen feed in a liquid phase process to form vinyl acetate from ethylene in a liquid acetic acid medium.

No prima facie obviousness established because there in no motivation to combine

Appellant submits that the Final Rejection lacks a proper basis for a *prima facie* obviousness rejection under 35 USC 103(a) or for a combination of the Sennewald references with Calcagno et al.

The cited references cannot be combined as a basis of an obviousness rejection. The Federal Circuit stated in *In re Dembiczak*, 175 F.3d 994, 999, 50 U.S.P.Q. 2d (BNA) 1614, 1617 (Fed. Cir. 1999):

> "Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references."

The burden is upon the Office to identify specifically "the reasons one of ordinary skill in the art would have been motivated to select the references and combine them to

render the claimed invention obvious." *In re Rouffet*, 149 F.3d 1350, 1359, 47 U.S.P.Q. 2d (BNA) 1453, 1459 (Fed.Cir. 1998). Appellant submits that no proper basis for such motivation has been provided by the Examiner in that a conclusory statement that a separate feed was merely an arbitrary choice is not a sufficient to establish a motivation for combination of references.

The Williams Declaration points out that feeding oxygen directly to a liquid phase system would be an inherently safer system because of the heat transfer ability of the liquid. Applicants submit that there is no apparent motivation to combine liquid-phase art with the gas-phase art of Sennewald. Since the Examiner contended that discussion of fixed bed catalyst systems is not material to the determination of patentability of Applicants' gas-phase fluidized bed process, Applicants submit that combination of a liquid phase reference is even further removed from the determination of patentability of Applicants' invention.

In any regard, Calcagno et al. do not disclose or suggest adding a total amount of oxygen to the reactor which exceeds flammability limits if gaseous feedstreams were combined or higher than may be used safely in a fixed bed reactor. The use of a higher amount of oxygen in the claimed invention is missing in the combination of references. Thus, the combination including Calcagno et al. does not meet the requirement of a prima facie showing of obviousness.

Since the art prior to Applicants' invention avoided separate oxygen feed in gas-phase systems due to expected undesirable effects such as hotspot formation, overheating, and catalyst destruction, there is no demonstrated motivation to combine the separate oxygen feed in a distinct liquid phase system, in which there is far less risk of formation of explosive mixture, with the gas-phase systems described by Sennewald. Other than improper use of hindsight, a person of ordinary skill in the art had no motivation to combine these references, which each describes different oxidation processes. The Office has not met its burden to establish an effective suggestion or motivation to combine the cited references.

Affirmative Evidence of non obviousness

In any event, as stated above, Appellants have provided affirmative evidence of the benefits of Appellants' invention, which overcome the obviousness rejection of the claimed invention.

Improper use of hindsight

Also, for the reasons stated above, Appellants submit that the rejection in based on improper hindsight.

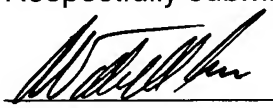
Summary

In summary, the Final Rejection provides no valid reason why a person skilled in the art would be motivated to combine these references. Without the improper use of hindsight, Appellant submits there is no basis for the combination of these references.

Conclusion

For the reasons stated above, Appellant submits that all claims now presented are in condition for allowance and requests that the Board reverse the Examiner's final rejection of these claims.

Respectfully submitted,



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Claims On Appeal

Claim 16: A process to manufacture vinyl acetate in a fluid-bed reactor containing feed stream inlets and gas outlets, in which mixtures comprising ethylene and acetic acid and an oxygen-containing gas are contacted with a particulate fluid-bed catalyst, comprising:

(a) introducing feed to the reactor in more than one inlet such that a feed stream primarily containing ethylene, acetic acid, or a mixture thereof does not contain oxygen within flammability limits, and such that a feed stream primarily containing an oxygen-containing gas does not contain hydrocarbons within flammability limits;

(b) controlling the amount of oxygen entering the reactor such that the outlet gas mixture is outside flammability limits; and

(c) recovering vinyl acetate,

wherein the amount of particulate catalyst including inert fluidizable particulates present in the fluid bed reactor is maintained at a level sufficient to allow for dissipation of heat generated during the reaction, and

wherein the total amount of oxygen employed is higher than may be used without danger of flammability, if all feed streams were combined.

Claim 18: The process of claim 16 wherein the reactor pressure ranges from about 50 to about 200 psig.

Claim 19: The process of claim 16 wherein the reactor temperature ranges from about 100°C to about 250°C.

Claim 20: The process of claim 16 wherein the oxygen-containing gas contains hydrocarbons comprising ethylene or acetic acid outside flammability limits.

Claim 21: The process of claim 16 wherein 60% of the particulate fluid bed catalyst has a particle size diameter below 200 microns and no more than 40% of the particulate catalyst has a diameter less than 40 microns.

Claim 22: The process of claim 16 wherein 50% of the particulate fluid bed catalyst has a particle size diameter below 100 microns and no more than 40% of the particulate catalyst has a diameter less than 40 microns.

Claim 23: The process of claim 16 wherein the particulate catalyst is combined with particulate inert material.

Claim 24: The process of claim 16 wherein the concentration of ethylene in the combined gaseous feeds entering the reactor is between 30 to 70 volume percent.

Claim 25: The process of claim 24 wherein the concentration of acetic acid in the combined gaseous feeds entering the reactor is between 10 to 25 volume percent.

Claim 26: The process of claim 25 wherein the concentration of oxygen in the combined gaseous feeds entering the reactor is between 8 to 25 volume percent.

Claim 27: The process for manufacturing vinyl acetate in a fluid bed reactor in which an oxygen-containing gas, ethylene and acetic acid are reacted in the presence of a fluid bed catalyst material to produce vinyl acetate, wherein the improvement comprises feeding ethylene and acetic acid into said fluid bed reactor through one or more inlets, and feeding an oxygen-containing gas stream into said fluid bed reactor through at least one further inlet provided that each of said streams fed to the reactor is outside its flammability limits, whereby levels of oxygen are employed higher than may be used in a fixed bed reactor, without danger of flammability, and co-joining the oxygen-containing gas, ethylene and acetic acid while in contact with said fluid bed catalyst material in said fluid bed reactor to enable the ethylene, acetic acid and oxygen to react to produce vinyl acetate and recovering said vinyl acetate from said fluid bed reactor, and wherein the amount of particulate catalyst including inert fluidizable particulates present in the fluid bed reactor is maintained at a level sufficient to allow for dissipation of heat generated during the reaction.

Claim 28: The process of claim 27 wherein the concentration of ethylene in the combined gaseous feed entering the reactor is between 30 to 70 volume percent, the concentration of acetic acid in the combined gaseous feeds is between 10 to 25 volume percent, and the concentration of oxygen in the combined gaseous feeds is between 8 to 25 volume percent.